



US005997569A

United States Patent [19]

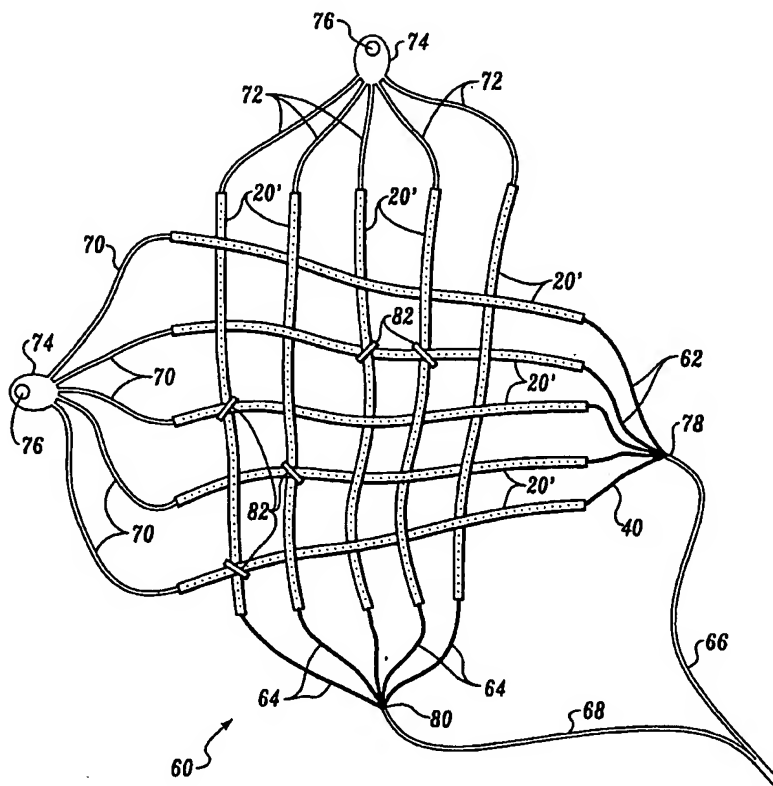
Chen et al.

[11] **Patent Number:** 5,997,569[45] **Date of Patent:** Dec. 7, 1999[54] **FLEXIBLE AND ADJUSTABLE GRID FOR MEDICAL THERAPY**[75] **Inventors:** James C. Chen, Bellevue, Wash.;
Brent Wiscombe, Mesa, Ariz.[73] **Assignee:** Light Sciences Limited Partnership,
Issaquah, Wash.[21] **Appl. No.:** 08/788,451[22] **Filed:** Jan. 29, 1997[51] **Int. Cl.⁶** A61N 5/00[52] **U.S. Cl.** 607/88; 607/92; 607/115;
607/116[58] **Field of Search** 606/14, 15, 16,
606/17, 10, 13, 2; 607/88, 89, 90, 92, 115,
116; 604/19, 20, 211[56] **References Cited****U.S. PATENT DOCUMENTS**

4,761,047	8/1988	Mori	607/88
5,358,503	10/1994	Bertwell et al.	606/2
5,445,608	8/1995	Chen et al.	604/20
5,531,741	7/1996	Barbacci	606/15
5,800,478	9/1998	Chen et al.	606/14

Primary Examiner—Linda C. M. Dvorak*Assistant Examiner*—R. Kearney*Attorney, Agent, or Firm*—Ronald M. Anderson[57] **ABSTRACT**

Flexible probes are arranged to achieve a desired light distribution pattern for administering light therapy at a treatment site in a patient's body. The flexible probes (20, 20', 92) each include a flexible substrate on which are mounted light emitting devices (30) in spaced-apart array. An optically transparent, biocompatible envelope (36) encloses the flexible substrate and components mounted thereon. In one embodiment, a link (44) couples a pair of the flexible probes together in parallel alignment for insertion at the treatment site. Thereafter, the probes are moved relative to each other within the link to achieve the desired light distribution pattern. In another embodiment, the flexible probes include flexible leaders (70, 72) attached to their distal ends, which terminate in suture tabs (74) that can be affixed to tissue adjacent the treatment site. The flexible probes are inserted into the treatment site generally aligned in a compact bundle and then are arrayed in a grid and spaced apart using links (82) to secure them at points where the flexible probes cross each other transversely. A further embodiment includes a strip (90) having a longitudinal slot (96), that opens into a channel (98) for receiving balls (94) formed on the distal ends of the flexible probes. The strip maintains the flexible probes in a spaced-apart array. Finally, another embodiment includes a flexible sheet (100) on which the flexible probes are mounted using sutures (108) or staples (102) after the sheet and flexible probes have been introduced to the treatment site.

29 Claims, 6 Drawing Sheets

39/5,K/3 (Item 3 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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011811859 **Image available**
WPI Acc No: 1998-228769/ 199820
XRPX Acc\No: N98-181143

Magnet and light therapy instrument - has detachable housing with threaded annular recess set in flexible strap for fastening to patient's body

Patent Assignee: MOSC PARALLEL CONSTR BUR (MOPA-R)
Inventor: ABRAMOV S A; BELOKRYLOV V D; KUBEKIN E N
Number of Countries: 001 Number of Patents: 001
Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
RU 2090222	C1	19970920	SU 5036837	A	19920410	199820 B

Priority Applications (No Type Date): SU 5036837 A 19920410

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
RU 2090222	C1	4	A61N-005/06	

Abstract (Basic): RU 2090222 C

A magnet and light (including laser) therapy instrument consists of a housing in the shape of a hollow cup (1) with magnetic field and **light sources** (2) inside its base, facing towards the cup's open end. The housing is detachable and its open end has an annular threaded recess to which a flexible strap (4) is attached by means of a threaded ring (5).

The housing can be moved along the strap and fixed in different positions for fastening to the patient's body, and its inner surface, opposite the threaded ring (5) has a second annular recess for a permanent magnet (6). Alongside the **light source** inside the housing there is a photometric **feedback** detector, and the strap can have a number of housings along its length.

ADVANTAGE - Wider range of functions and more effective treatment, combining light or laser irradiation with magnetic and other therapies. -
Dwg.1/2

Title Terms: MAGNET; LIGHT; THERAPEUTIC; INSTRUMENT; DETACH; HOUSING; THREAD; ANNULAR; RECESS; SET; FLEXIBLE; STRAP; FASTEN; PATIENT; BODY
Derwent Class: P34; S05

International Patent Class (Main): A61N-005/06

International Patent Class (Additional): A61N-002/08

File Segment: EPI; EngPI

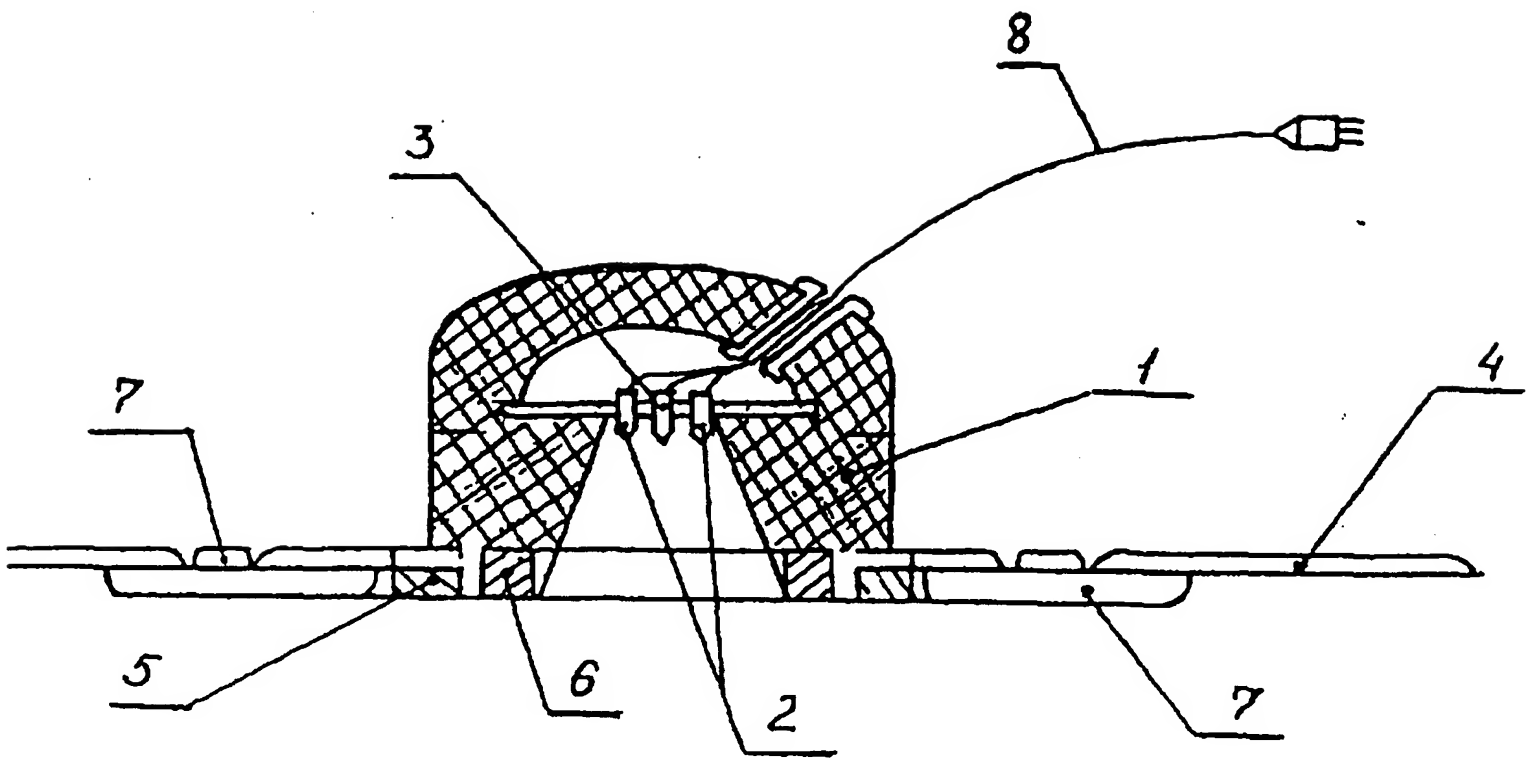
Magnet and light therapy instrument...

...Abstract (Basic): of a housing in the shape of a hollow cup (1) with magnetic field and **light sources** (2) inside its base, facing towards the cup's open end. The housing is detachable...

...threaded ring (5) has a second annular recess for a permanent magnet (6). Alongside the **light source** inside the housing there is a photometric **feedback** detector, and the strap can have a number of housings along its length...

International Patent Class (Main): A61N-005/06

International Patent Class (Additional): A61N-002/08



39/5,K/4 (Item 4 from file: 350)
DIALOG(R)File 350:Derwent WPIX
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010428912 **Image available**
WPI Acc No: 1995-330232/ 199543
XRPX Acc No: N95-248565

Handheld coloured- light therapeutic appts. with controlled rate of
flashing - has selector to control frequency at which colours are to be
emitted in accordance with biofeedback from monitor of heart rate, skin
temp. or resistance or blood pressure

Patent Assignee: SYNTON GMBH FORSCHUNG ENTWICKLUNG-VERTRI (SYNT-N)

Inventor: LENKE M

Number of Countries: 017 Number of Patents: 002

Patent Family:

Patent No	Kind	Date	Applicat No	Kind	Date	Week
EP 674468	A2	19950927	EP 95104222	A	19950322	199543 B
EP 674468	A3	19970129	EP 95104222	A	19950322	199713

Priority Applications (No Type Date): DE 94U17441 U 19941103; DE 94U5071 U
19940324

Cited Patents: No-SR.Pub; 1.Jnl.Ref; CN 1051677; CN 1075074; DE 3339522; DE
3447105; DE 3826723; DE 4108328; EP 109935; EP 278074; EP 306569; EP
320080; US 4734560; US 5171215; WO 9011798

Patent Details:

Patent No	Kind	Lan Pg	Main IPC	Filing Notes
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EP 674468	A2	G	13 H05B-033/08	
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Designated States (Regional): AT BE CH DE DK ES FR GB GR IE IT LI LU MC
NL PT SE

EP 674468	A3	H05B-033/08
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Abstract (Basic): EP 674468 A

The appts. (1) includes switches (4-8) corresponding to different
colours controlled by a selector (10). Also provided is a monitor
(14-16) e.g. EEG, EKG which measures e.g. patient skin temp., blood
pressure. A cable (11) with a free plug (12) is inserted into a power
supply socket (13) to supply power. The monitor is attached to the lobe
of an ear and plugged (16) in.

A circuit board projecting from the handle (2) into the head (3) of
the appts. carries the switches for differently coloured LED arrays.
An ON/OFF switch (9) and the selector of pulsed or continuous
illumination are also carried. Cascaded driver circuits within the
handle supply the LED currents so that selected colour gps. flash at
a selected rate or in synchronism with the heart.

USE/ADVANTAGE - For improvement of circulation and relief of pain.
Flashing mode affords stronger stimulation by increased perceptibility
or fluctuation effects.

Dwg.1/4

Title Terms: COLOUR; LIGHT; THERAPEUTIC; APPARATUS; CONTROL; RATE; FLASH;
SELECT; CONTROL; FREQUENCY; COLOUR; EMIT; ACCORD; BIOFEEDBACK; MONITOR;
HEART; RATE; SKIN; TEMPERATURE; RESISTANCE; BLOOD; PRESSURE

Derwent Class: S05; X26

International Patent Class (Main): H05B-033/08

International Patent Class (Additional): H05B-039/09

File Segment: EPI

Handheld coloured- light therapeutic appts. with controlled rate of
flashing...

...has selector to control frequency at which colours are to be emitted in
accordance with biofeedback from monitor of heart rate, skin temp. or

resistance or blood pressure

...Abstract (Basic): handle (2) into the head (3) of the appts. carries the switches for differently coloured **LED** arrays. An ON/OFF switch (9) and the selector of pulsed or continuous illumination are also carried. Cascaded driver circuits within the handle supply the **LED** currents so that selected colour gps. flash at a selected rate or in synchronism with...

...Title Terms: **BIOFEEDBACK** ;

39/5,K/10 (Item 10 from file: 347)
DIALOG(R)File 347:JAPIO
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06031219 **Image available**
ELECTRIC THERAPEUTIC APPARATUS

PUB. NO.: 10-314319 [JP 10314319 A]
PUBLISHED: December 02, 1998 (19981202)
INVENTOR(s): ODA NOBUO
APPLICANT(s): ODA NOBUO [000000] (An Individual), JP (Japan)
APPL. NO.: 09-130138 [JP 97130138]
FILED: May 20, 1997 (19970520)
INTL CLASS: [6] A61N-001/40 ; A61N-001/10
JAPIO CLASS: 28.2 (SANITATION -- Medical)
JAPIO KEYWORD: R005 (PIEZOELECTRIC FERROELECTRIC SUBSTANCES); R116
(ELECTRONIC MATERIALS -- Light Emitting Diodes , LED)

ABSTRACT

PROBLEM TO BE SOLVED: To treat osteoporosis, broken bone and the like handily at home or other places by a method wherein a human body to be treated is sandwiched by a pair of electrodes constituted of a conductor covered with an insulating material to let an alternating current flow to a bone part and an alternating current is applied between the electrodes.

SOLUTION: In a structure of an electrode pad 25, insulation electrodes 2a or insulation electrodes 2a' are buried respectively into a coverlet 26 and a sleeping mat 27. The surfaces of the insulation electrodes 2a and 3a are covered with a resin film, a resin paint or the like. That is, metal parts of the insulation electrodes 2a and 2a' contact a living being through an insulating body. In the treatment using this electrode pad 25, a patient is laid between the coverlet 26 and the sleeping mat 27 to position an affected part 28 between the insulation electrodes 2a and 2a'. As a result, a bone enters an electric field made by the electrodes 2a and 2a' and a current flows through the bone. Thus, current can flow through the bone with a simple structure simply by mounting the insulation electrodes 2a and 2a' in bedding for domestic use

ELECTRIC THERAPEUTIC APPARATUS

...PUBLISHED: 19981202)
INTL CLASS: A61N-001/40 ; A61N-001/10
...JAPIO KEYWORD: Light Emitting Diodes , LED)

ABSTRACT

...treated is sandwiched by a pair of electrodes constituted of a conductor covered with an insulating material to let an alternating current flow to a bone part and an alternating current is...

39/5,K/13 (Item 13 from file: 347)
DIALOG(R)File 347:JAPIO
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03644064 **Image available**

ELECTRICALLY STIMULATING APPARATUS FOR TREATMENT

PUB. NO.: 04-009164 [JP 4009164 A]
PUBLISHED: January 13, 1992 (19920113)
INVENTOR(s): SERIZAWA KATSUSUKE
MORI CHIHARU
APPLICANT(s): TOUYOU IGAKU GIJIYUTSU KIYOUIKU SHINKOU ZAIDAN [000000] (A
Japanese Company or Corporation), JP (Japan)
ITOU CHIYOUTANPA KK [418023] (A Japanese Company or
Corporation), JP (Japan)
APPL. NO.: 02-114173 [JP 90114173]
FILED: April 27, 1990 (19900427)
INTL CLASS: [5] A61N-001/32 ; A61N-001/08
JAPIO CLASS: 28.2 (SANITATION -- Medical)
JAPIO KEYWORD: R116 (ELECTRONIC MATERIALS -- Light Emitting Diodes ,
LED)
JOURNAL: Section: C, Section No. 930, Vol. 16, No. 156, Pg. 14, April
16, 1992 (19920416)

ABSTRACT

PURPOSE: To enable safe treatment by allowing a therapist to adjust intensity and timing of **electric stimulation** freely based on biological **feedback** information to be obtained when the **electric stimulation** is applied to lesion of a patient through his hand.

CONSTITUTION: This apparatus is provided with a current generation means 3 for generating current with a specified frequency, a first conducting element 5 and a second conducting element 6 connected to a part of a therapist and that of a patient, respectively. An adjusting means comprising an output control section 4 and the conducting elements 5 and 6 is provided to allow the therapist to adjust intensity and timing of **electric stimulation** freely based on sensual biological **feedback** information to be obtained when the **electric stimulation** is applied to a lesion of the patient through his hand. This enables safe and effective treatment.

ELECTRICALLY STIMULATING APPARATUS FOR TREATMENT

...PUBLISHED: 19920113)
INTL CLASS: A61N-001/32 ; A61N-001/08
...JAPIO KEYWORD: Light Emitting Diodes , LED)

ABSTRACT

PURPOSE: To enable safe treatment by allowing a therapist to adjust intensity and timing of **electric stimulation** freely based on biological **feedback** information to be obtained when the **electric stimulation** is applied to lesion of a patient through his hand...

... 5 and 6 is provided to allow the therapist to adjust intensity and timing of **electric stimulation** freely based on sensual biological **feedback** information to be obtained when the **electric stimulation** is applied to a lesion of the patient through his hand. This enables safe and

...

⑫ 公開特許公報(A) 平4-9164

⑤ Int. Cl.⁵

識別記号

庁内整理番号

⑬ 公開 平成4年(1992)1月13日

A 61 N 1/32
1/087831-4C
7831-4C

審査請求 未請求 請求項の数 3 (全5頁)

⑭ 発明の名称 治療用電気刺激装置

⑯ 特 願 平2-114173

⑰ 出 願 平2(1990)4月27日

⑱ 発 明 者 芹 澤 勝 助 東京都新宿区西早稲田3丁目26番15号

⑲ 発 明 者 森 千 春 東京都文京区白山1丁目23番15号 伊藤超短波株式会社内

⑳ 出 願 人 財団法人東洋医学技術 東京都新宿区西早稲田3丁目26番15号
教育振興財団

㉑ 出 願 人 伊藤超短波株式会社 東京都文京区白山1丁目23番15号

㉒ 代 理 人 弁理士 志賀 正武 外2名

明 細 書

1. 発明の名称

治療用電気刺激装置

2. 特許請求の範囲

(1) 所定の周波数の電流を発生する電流発生手段と、治療者および患者の生体一部に各々接続される第1の導子および第2の導子とを備えた治療用電気刺激装置であって、

患者の手を通して患者の患部への電気刺激を与える際に得られる感覚的なバイオフィードバック情報をもとに、電気刺激の強さとタイミングの調整を治療者が自由にできる調整手段を具備することを特徴とする治療用電気刺激装置。

(2) 前記第1の導子と第2の導子との間を流れる電流の値を踏込量に応じて変化させる足踏式電流可変手段を具備することを特徴とする請求項1記載の治療用電気刺激装置。

(3) 前記足踏式電流値可変手段による踏込量に対する電流値の特性を変える特性可変手段を具備す

ることを特徴とする請求項2記載の治療用電気刺激装置。

3. 発明の詳細な説明

「産業上の利用分野」

この発明は、従来から実用されているマッサージ療法に物理療法として広く用いられている低周波療法を効果的に併用して治療を行う治療用電気刺激装置に係わり、特に刺激を与えるタイミングと、その強さを治療者自身が他覚的なフィードバック情報をもとに任意に設定できる治療用電気刺激装置に関する。

「従来の技術」

従来より、低周波治療器などの治療用電気刺激装置は、一般的に第8図に示すように二つの電極(導子と呼ばれている)1、1と、これら電極間に電流(低周波電流など)を流す電流発生器2とから構成されている。

この種の装置の使用方法としては、一方の導子1を患部に貼り付け、他方をこれから離間させた位置に貼り付ける。そして、これら電極間に患

以上説明したように、この発明による治療用電気刺激装置によれば、治療者中に患者に対して与える電気刺激のタイミングとその強度を、当該患者の反応所謂バイオフィードバック情報に基づいて治療者が任意に決定できるので、予め決定したレベルの電気刺激を一定して与える従来の治療用電気刺激装置に比べて電気刺激による危険を防止することができるという極めて大きな安全上の効果が得られる。

また、電気刺激を治療者の身体を通して患者に与えるので、従来のように二つの導子を患部に装着して行う所謂機械的な感覚と異なり、治療者と患者の“肌の触合い”的なソフトな感覚で治療を行うことができるという顕著な効果が得られる。

さらにまた、従来より行われていた単なる徒手によるマッサージと併用することにより、その効果を大幅に高めることができるという効果も得られる。

4. 図面の簡単な説明

第1図はこの発明の一実施例である治療用電気

刺激装置を示すブロック図、第2図は同装置を構成する出力制御部を示す側面図、第3図は同出力制御部の回路図、第4図は同出力制御部の踏込量対電流特性の一例を示す図、第5図および第6図は各々前記治療用電気刺激装置を構成する導子を示す斜視図、第7図は前記出力制御部の応用例を示す断面図、第8図は従来の治療用電気刺激装置の外観を示す斜視図である。

3 ……低周波発生部、4、16 ……出力制御部、

4a ……電流表示器、5、6 ……導子

(4、5、6または16、5、6は調整手段)。

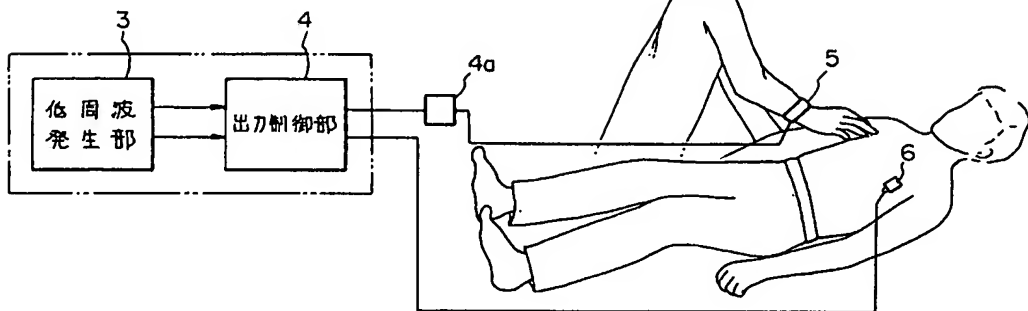
出願人 財団法人 東洋医学技術教育振興財団

伊藤超短波株式会社

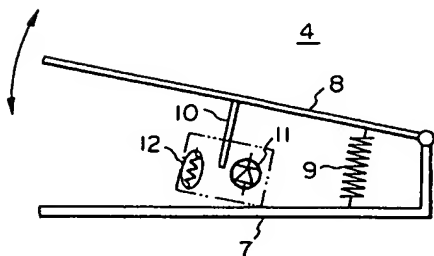
-11-

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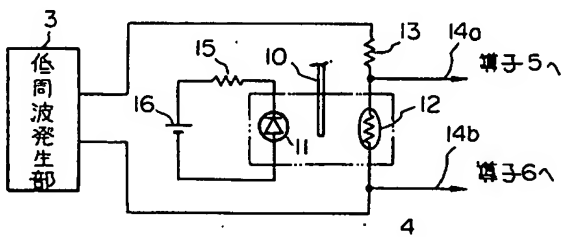
第1図



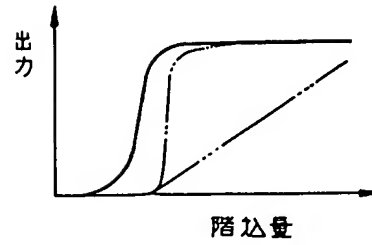
第2図



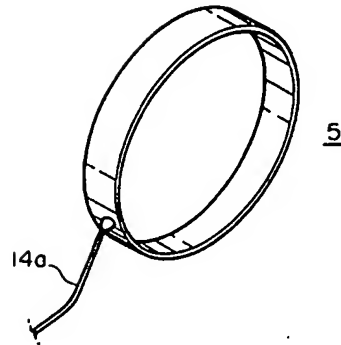
第3図



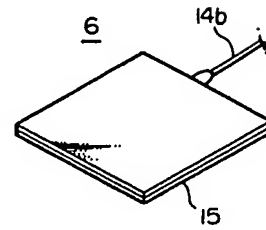
第 4 図



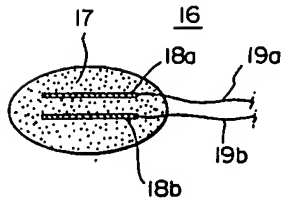
第 5 図



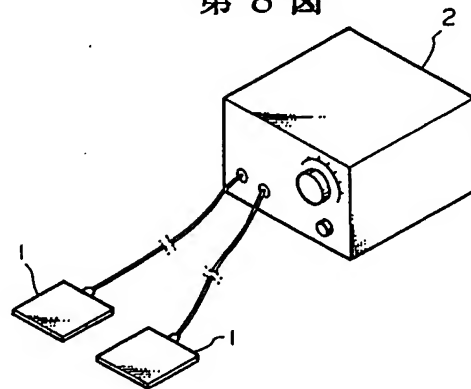
第 6 図



第 7 図



第 8 図



Set	Items	Description
S1	1160	(ELECTRIC? OR LIGHT OR THERM? OR HEAT OR KINES OR KINESIO)- () (THERAPY OR THERAPEUT?) OR KINESIOTHERAP? OR KINESTHERAP? OR ELECTROSTIM? OR ELECTRO() STIMUL?
S2	31910	TENS OR (TRANSCUTAN? OR TRANS() CUTANE?) () (NERVE? ? OR ELEC- TRIC?) () STIMULAT? OR ELECTRIC? () STIMULAT?
S3	0	DC=(E02.810.150 OR E02.779.468 OR E02.831.580.468 OR E2.69- 0.265)
S4	26315	(PHOTO OR PHOTON OR LIGHT OR LASER OR MASER OR COHERENT? () - LIGHT) () (EMIT? OR EMISS?) () (DIODE? OR ELECTROD? OR SOURCE? OR PATCH?)
S5	80556	(PHOTO OR PHOTON OR LIGHT OR LASER OR MASER OR COHERENT? () - LIGHT) () (DIODE? OR ELECTROD? OR SOURCE? OR PATCH?)
S6	112964	LED OR LEDS OR PED OR PEDS
S7	83842	BIOFEEDBACK? OR FEEDBACK? OR FEED() BACK?
S8	22430	CLOSEDLOOP? OR CLOSED() LOOP?
S9	141258	MESH? OR GRID?
S10	80326	(METAL? OR INSULAT? OR HEAT() CONDUCT? OR RESIN?) () (SHEET? OR MATERIAL? OR HOUSING?)
S11	152883	MOLD OR MOLDS OR MOLDED OR MOLDING OR MOLDABL?
S12	395	REMOLD?
S13	12790	REFORM OR REFORMS OR REFORMED OR REFORMING OR REFORMABL?
S14	1429522	FORM OR FORMS OR FORMED OR FORMING OR FORMABL?
S15	248112	FLEXIBL?
S16	79564	CONFORM OR CONFORMS OR CONFORMED OR CONFORMING OR CONFORMA- BL?
S17	298358	RETAIN OR RETAINS OR RETAINED OR RETAINING OR RETAINABL?
S18	4821	MEMORY() SHAPE? OR SHAPE() MEMORY
S19	370031	ADAPT OR ADAPTS OR ADAPTED OR ADAPTING OR ADAPTIBL?
S20	607125	SHAPE OR SHAPES OR SHAPED OR SHAPING OR SHAP?BL?
S21	152091	BEND OR BENDS OR BENT OR BENDING OR BEND?BL?
S22	475635	CONFIGUR?
S23	16773	RECONFIGUR?
S24	1429522	FORM OR FORMS OR FORMED OR FORMING OR FORM?BL?
S25	24514	CUSTOMIZ? OR CUSTOMIS?
S26	86310	CAST OR CASTS OR CASTING OR CAST?BL?
S27	458687	ADJUST OR ADJUSTS OR ADJUSTED OR ADJUSTING OR ADJUST?BL?
S28	11452	IC=A61N?
S29	9042	CUFF OR CUFFS OR CUFFED OR CUFFING
S30	88856	SLEEVE OR SLEEVES OR SLEEVED OR SLEEVING
S31	7979	S1:S3 AND S4:S6
S32	2299	S31 AND (S9:S10 OR S29:S30) AND S11:S27
S33	518	S32 AND S7:S8
S34	174	S33 AND S11:S27(10N) (S9:S10 OR S29:S30)
S35	6	S34 AND S1:S3(10N)S4:S6
S36	13	S34 AND S4:S6(10N) (S9:S10 OR S29:S30)
S37	6	S34 AND S1:S3(10N)S4:S6
S38	16	S35:S37
S39	5	S38 AND PY<2002
S40	5	IDPAT (sorted in duplicate/non-duplicate order)

? show files

File 348:EUROPEAN PATENTS 1978-2003/Nov W03

(c) 2003 European Patent Office

File 349:PCT FULLTEXT 1979-2002/UB=20031127,UT=20031120

(c) 2003 WIPO/Univentio

40/5,K/5 (Item 5 from file: 349)
DIALOG(R) File 349:PCT FULLTEXT
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00504775 **Image available**

**IMPROVED PULSED ELECTROMAGNETIC ENERGY TREATMENT APPARATUS AND METHOD
DISPOSITIF ET PROCEDE AMELIORES DE TRAITEMENT PAR ENERGIE ELECTROMAGNETIQUE
PULSEE**

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Patent and Priority Information (Country, Number, Date):

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Detailed Description
Claims

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English Abstract

A method of and apparatus for the treatment of chronic wounds using pulsed electromagnetic energy provides a constant, known and replicable dosage output which remains unaffected by the capacitance of the patient's body. The apparatus includes a pulsed electromagnetic energy generator, a power level controller and one or more thin applicators which can be **flexible**. The applicators are located immediately adjacent to the patient's body, without the aid of a support member or removal of any dressings or bandages. The generator output is automatically **adjusted** in response to instructions from a field strength sensor located on or near the applicator. Multiple applicators selected to operate simultaneously at different treatment dosage levels are connected to the generator by multi-conductor cables and readily located directly on the treatment area. Each applicator is a pad including etched printed circuits. The circuits are matched and pre-tuned. An applicator-to-patient proximity detector is also incorporated in or on each applicator and connected to the generator via a power controller to provide for direct monitoring of the treatment site and precise control of treatment dosage.

French Abstract

L'invention concerne un procede et un dispositif destines au traitement des plaies chroniques par energie electromagnetique pulsee, et produisant une sortie a dose constante, connue et reproductible qui n'est pas affectee par la capacite du corps du patient. Le dispositif comprend un generateur d'energie electromagnetique pulsee, une commande du niveau de puissance et un ou plusieurs applicateurs minces qui peuvent etre **flexibles**. On place les applicateurs de maniere qu'ils soient immediatement adjacents au corps du patient, sans element de support ou

retrait de pansements ou de bandages. La sortie du generateur est reglee automatiquement en reponse aux instructions provenant d'un detecteur d'intensite de champ dispose sur ou a proximite de l'applicateur. Des applicateurs multiples selectionnes de maniere a fonctionner simultanement avec divers niveaux de dosage de traitement, sont connectes au generateur par des multiconducteurs et peuvent etre facilement disposes sur la zone de traitement. Chaque applicateur est une plaque portant des circuits imprimes graves. Ces circuits sont apparies et preregles. Un detecteur de la proximite patient-detecteur est en outre incorpore dans ou sur chaque applicateur, et connecte au generateur par une unite de commande de puissance, et permet d'assurer une surveillance directe du site de traitement et un reglage precis du dosage de traitement.

Patent and Priority Information (Country, Number, Date):

Patent: ... 19990722

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Detailed Description

Claims

English Abstract

...energy generator, a power level controller and one or more thin applicators which can be **flexible**. The applicators are located immediately adjacent to the patient's body, without the aid of a support member or removal of any dressings or bandages. The generator output is automatically **adjusted** in response to instructions from a field strength sensor located on or near the applicator...

French Abstract

...une commande du niveau de puissance et un ou plusieurs applicateurs minces qui peuvent etre **flexibles**. On place les applicateurs de maniere qu'ils soient immediatement adjacents au corps du patient...

Publication Year: 1999

Detailed Description

... seen limited use in other areas of healing.

Clinical research has shown that treatment with **electrical stimulation** or electromagnetic fields can enhance the healing rate of pressure ulcers unresponsive to conventional therapy. For example, pulsed **electrical stimulation** has been shown to enhance the healing rate of decubitus ulcers. This therapeutic approach stems...

...of healing and that healing can be induced by negative electrical potential. Unfortunately, this has **led** to unsubstantiated claims that **electrical stimulation** cures a wide variety of health problems, thereby alienating the medical profession. Though this idea...

...few well designed experiments concerning cellular mechanisms have been conducted, some published reports indicate that **electrical stimulation** activates macrophages and increases cell proliferation, collagen synthesis and the expression of fibroblast receptors for...

...Treatment devices emitting magnetic and/or electromagnetic energy offer significant advantages over other types of **electrical stimulators** because magnetic and electromagnetic energy can be applied externally through clothing and wound dressings, thereby...

...is relatively low, typically in the low frequency or audio range. Other devices, which utilize **electrical stimulation** between electrodes,

represent a substantially different approach to medical treatment from the present invention for...to the applicator and produces a ratio signal that is delivered to the controller for **adjusting** the amplitude and phase of the signals generated by the exciter. The applicator, which includes...99/36127 PCTIUS99/00864 more printed circuit boards, with the primary coil and secondary coil **forming** a matching network for effecting a highly efficient RF output. In other words, the applicator...

...specifications to the human body for the purposes of inducing cell proliferation. In its preferred **form**, the present invention includes a pulsed electromagnetic energy generator, control means, including a power level...applicator and beyond, to the surface of the patient's WO 99/36127 PCTIUS99/00864 **configuration** of the present invention, a correct treatment dosage is easily and effectively delivered to the... level controller 44. Control signals 42, 42i, 42ii from the power level controller 44 reflect **feedback** information 54 from the field strength detector positioned on each applicator 14. One or more...a second subcircuit, the pulse width timer I 0 66, which produces a single consistently **shaped** pulse envelope. The output of timer 66 is then used as an enable pulse for...indicator flashing circuit 1 14 is enabled which then starts flashing the single service required **LED** II 6.

The actual RF energy that is transmitted from each treatment applicator 14 is...

...indicator flashing circuit 1 14 is enable which then starts flashing the single service required **LED**.

When the treatment applicator 14 is in place, a body proximity sensor switch (FIG. 9) is closed, and the applicator in place **LED** 124 is illuminated. If this switch inadvertently opens, an indicator flashing circuit 126 is enabled and the check applicator **LED** 128 flashes.

FIG. 6 describes in more detail how one embodiment of the present invention...

...a coaxial cable connected to port 152.

FIG. 6 further shows one preferred circuit for **adjusting** the ...143. Voltage regulator 143 supplies DC power to the RF oscillator 130 and amplifier, thereby **adjusting** the output of the amplifier and, hence, the treatment dosage.

FIG. 7 is a block...

...and reflected power measuring circuits 46 are connected to separate treatment applicators 14 via labeled **flexible** cables, each applicator 14 having its own detectors and sensors (FIGS. 9 and 10).

From...

...monitored by a display driver circuit 162. Circuit 162 is wired to illuminate the low **LED** 164 when the battery voltage is below a defined voltage level and requires recharging, to illuminate the OK **LED** 33 when the battery voltage is at an acceptable voltage level, and to flash the high **LED** 34 if the battery voltage is sensed to be higher than an acceptable limit. If...

...includes one or more circuits (such as etched copper printed circuit, stamped wire circuit, etc.) **formed** on a single substrate, such as an assembly comprising one or more circuit boards. Preferably...

...FIGS. 9-11, applicator 14 includes a single circuit 174 that is laminated between **insulating sheets** of **flexible** Kapton 178, or similar material with high dielectric properties. Circuit 174 includes an etched...

...174 and plane 176 are brought out to a connection interface 186 to which a **flexible** and shielded, multi-conductor cable 188 is permanently attached.

Connection to the generator unit 12...

...above having multiple circuits 174 and 177. In the applicator 14, the upper circuit 174 **forms** the secondary of an RF transformer. The primary circuit 177 is etched on the other...

...tumor spiral, has a fixed, surface mount capacitor 192 connected in parallel with it to **form** a tank circuit resonant at 27.12 Mhz. Circuit 177 (primary), comprising a single turn...182 is sent to the power level controller 44, where it is used as a **feedback** control signal. If at any time, detector 182 measures radiated electromagnetic energy output level above...single substrate, such as a circuit board. The substrate is preferably thin and may be **flexible** or rigid and constructed from one or more sheets. When multiple circuits are included (FIGS...

...applicator 14 to the generating unit 12 is a cable.

Reference throughout this description to **LEDs** and other specific indicators was made for descriptive purposes only. It is understood that other...

Claim

... according to claim 1, wherein said circuit means further comprises a coil, a fixed capacitor **configured** with said coil, and a ground plane located beneath said coil.

5 Apparatus according to...

...proximate said secondary circuit, wherein said secondary circuit comprises an inductor and a fixed capacitor **configured** as a tank circuit, and wherein said primary circuit comprises an inductor and a capacitor...

...proximate said secondary circuit, wherein said secondary circuit comprises an inductor and a fixed capacitor **configured** as a tank circuit, and wherein said primary circuit comprises an inductor and a capacitor...

...according to claim 6, wherein said multiple circuits further comprise a coil, a fixed capacitor **configured** with said coil, and a ground plane located beneath said coil.

9 Apparatus according to...

...on said lower surface.

I 1. Apparatus according to claim 6, wherein said substrate is **flexible**

12 Apparatus according to claim I 1, wherein said substrate further comprises multiple sheets, and...proximate said secondary circuit, wherein said secondary circuit comprises an inductor and a fixed

capacitor **configured** as a tank circuit, and wherein said primary circuit comprises an inductor and a capacitor...

...generating means by a cable.

24 Apparatus according to claim 23, wherein said applicator is **flexible**

25 Apparatus according to claim 23, wherein said applicator is rigid.

26 Apparatus according to...circuit for receiving said time setting output and for producing a single, fixed width, fixed **shaped** enabling pulse, and a high frequency oscillator for receiving said enabling pulse and for generating for generating a **feedback** signal corresponding to said measured output.

44 Apparatus according to claim 43, wherein said power level controller farther comprises means for comparing said **feedback** signal to predetermined values and means for disabling said generating means when said **feedback** signal fails said comparison.

45 Apparatus according to claim 43, wherein said power level controller further comprises means for **adjusting** an output of said generator in response to said **feedback** signal.

46 Apparatus according to claim 43, wherein said power controller further comprises means for...

...located on said applicator for monitoring a position of said applicator and for generating a **feedback** signal corresponding to said position.

48 Apparatus according to claim 47, wherein said power level controller further comprises means for actuating an appropriate indicator in response to said **feedback** signal.

49 Apparatus according to claim 47, wherein said monitoring means is a body proximity...electromagnetic energy from said applicator, directly measuring said treatment dosage emitted from said applicator, supplying **feedback** signals to said electromagnetic generator corresponding to said treatment dosage, and **adjusting** said pulsed high frequency energy output in response to said **feedback** signals.

67 An electromagnetic energy treatment method comprising generating multiple pulsed high frequency energy outputs...

...electromagnetic energy from said applicator, directly measuring said treatment dosage emitted from said applicator, supplying **feedback** signals to said electromagnetic generator corresponding said treatment dosage, and **adjusting** said pulsed high frequency energy output in response to said **feedback** signals.

68 An electromagnetic energy treatment method comprising generating a pulsed high frequency energy output...and replicable dosage by monitoring an output of said applicator at said applicator and automatically **adjusting** said output in response to **feedback** signals generated during

said monitoring step.

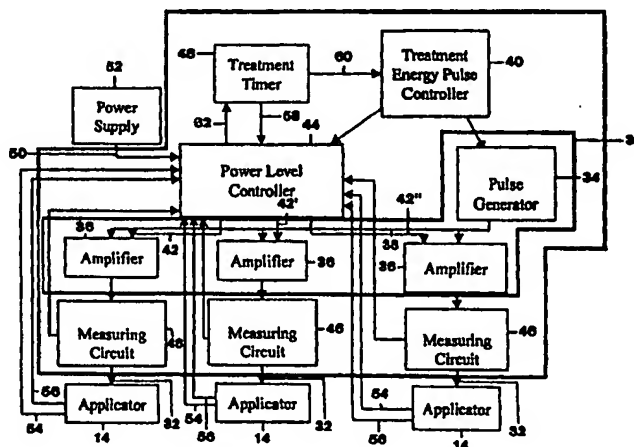
77 Method according to claim 75, further comprising maintaining...



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A61N 1/40	A2	(11) International Publication Number: WO 99/36127 (43) International Publication Date: 22 July 1999 (22.07.99)
<p>(21) International Application Number: PCT/US99/00864</p> <p>(22) International Filing Date: 15 January 1999 (15.01.99)</p> <p>(30) Priority Data: 60/071,396 15 January 1998 (15.01.98) US</p> <p>(71) Applicant: AMETHYST TECHNOLOGIES, INC. [US/US]; 1435 N. Hayden Road, Scottsdale, AZ 85257 (US).</p> <p>(72) Inventors: GEORGE, Frank, R.; 10187 E. San Salvador Drive, Scottsdale, AZ 85258 (US). LOYA, Arthur, A.; 510 S. Extension, No. 1037, Mesa, AZ 85210 (US). RITZ, Mary, C.; 10187 E. San Salvador Drive, Scottsdale, AZ 85258 (US). BRYANT, Robert, T.; 1831 E. Apache Boulevard #154, Tempe, AZ 85281 (US).</p> <p>(74) Agents: RILEY, Paul, J. et al.; Morrison & Foerster LLP, 2000 Pennsylvania Avenue, N.W., Washington, DC 20006-1888 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p>Published <i>Without international search report and to be republished upon receipt of that report.</i></p>	

(54) Title: IMPROVED PULSED ELECTROMAGNETIC ENERGY TREATMENT APPARATUS AND METHOD



(57) Abstract

A method of and apparatus for the treatment of chronic wounds using pulsed electromagnetic energy provides a constant, known and replicable dosage output which remains unaffected by the capacitance of the patient's body. The apparatus includes a pulsed electromagnetic energy generator, a power level controller and one or more thin applicators which can be flexible. The applicators are located immediately adjacent to the patient's body, without the aid of a support member or removal of any dressings or bandages. The generator output is automatically adjusted in response to instructions from a field strength sensor located on or near the applicator. Multiple applicators selected to operate simultaneously at different treatment dosage levels are connected to the generator by multi-conductor cables and readily located directly on the treatment area. Each applicator is a pad including etched printed circuits. The circuits are matched and pre-tuned. An applicator-to-patient proximity detector is also incorporated in or on each applicator and connected to the generator via a power controller to provide for direct monitoring of the treatment site and precise control of treatment dosage.

Set	Items	Description
S1	47144	(ELECTRIC? OR LIGHT OR THERM? OR HEAT OR KINES OR KINESIO)- () (THERAPY OR THERAPEUT?) OR KINESIOTHERAP? OR KINESTHERAP? OR ELECTROSTIM? OR ELECTRO()STIMUL?
S2	272350	TENS OR (TRANSCUTAN? OR TRANS()CUTANE?) () (NERVE? ? OR ELEC- TRIC?) () STIMULAT? OR ELECTRIC? () STIMULAT?
S3	8738	DC=(E02.810.150 OR E02.779.468 OR E02.831.580.468 OR E2.69- 0.265)
S4	58934	(PHOTO OR PHOTON OR LIGHT OR LASER OR MASER OR COHERENT? () - LIGHT) () (EMIT? OR EMISS?) () (DIODE? OR ELECTROD? OR SOURCE? OR PATCH?)
S5	162390	(PHOTO OR PHOTON OR LIGHT OR LASER OR MASER OR COHERENT? () - LIGHT) () (DIODE? OR ELECTROD? OR SOURCE? OR PATCH?)
S6	862409	LED OR LEDS OR PED OR PEDS
S7	556038	BIOFEEDBACK? OR FEEDBACK? OR FEED()BACK?
S8	100066	CLOSEDLOOP? OR CLOSED()LOOP?
S9	1515956	MESH? OR GRID?
S10	264156	(METAL? OR INSULAT? OR HEAT()CONduc? OR RESIN?) () (SHEET? OR MATERIAL? OR HOUSING?)
S11	246485	MOLD OR MOLDS OR MOLDED OR MOLDING OR MOLDBL?
S12	1281	REMOLD?
S13	145433	REFORM OR REFORMS OR REFORMED OR REFORMING OR REFORMABL?
S14	5996886	FORM OR FORMS OR FORMED OR FORMING OR FORMABL?
S15	432629	FLEXIBL?
S16	80601	CONFORM OR CONFORMS OR CONFORMED OR CONFORMING OR CONFORMA- BL?
S17	501478	RETAIN OR RETAINS OR RETAINED OR RETAINING OR RETAINABL?
S18	33331	MEMORY()SHAPE? OR SHAPE()MEMORY
S19	415084	ADAPT OR ADAPTS OR ADAPTED OR ADAPTING OR ADAPTIBL?
S20	1543554	SHAPE OR SHAPES OR SHAPED OR SHAPING OR SHAP?BL?
S21	374675	BEND OR BENDS OR BENT OR BENDING OR BEND?BL?
S22	1031725	CONFIGUR?
S23	46149	RECONFIGUR?
S24	5996888	FORM OR FORMS OR FORMED OR FORMING OR FORM?BL?
S25	38414	CUSTOMIZ? OR CUSTOMIS?
S26	367226	CAST OR CASTS OR CASTING OR CAST?BL?
S27	535256	ADJUST OR ADJUSTS OR ADJUSTED OR ADJUSTING OR ADJUST?BL?
S28	0	IC=A61N?
S29	56823	CUFF OR CUFFS OR CUFFED OR CUFFING
S30	22158	SLEEVE OR SLEEVES OR SLEEVED OR SLEEVEING
S31	78	S1:S3 AND S4:S6 AND (S9:S10 OR S29:S30)
S32	14	S31 AND (S7:S8 OR S11:S27 OR S28)
S33	0	S1:S3 AND S4:S6 AND KAPTON?
S34	9	S32 AND PY<2002
S35	5	RD (unique items)

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Title: Selective fascicular stimulation of the rat sciatic nerve with multipolar polyimide cuff electrodes

Author(s): Navarro X (REPRINT) ; Valderrama E; Stieglitz T; Schuttler M
Corporate Source: Univ Autonoma Barcelona, Fac Med, Dept Cell Biol Physiol & Immunol, Neuroplast & Regenerat Grp, E-08193 Bellaterra//Spain/
(REPRINT); Univ Autonoma Barcelona, Fac Med, Dept Cell Biol Physiol & Immunol, Neuroplast & Regenerat Grp, E-08193 Bellaterra//Spain//; Univ Autonoma Barcelona, Dept Comp Sci, E-08193 Bellaterra//Spain//; Fraunhofer Inst Biomed Engn, Biohybrid Syst Dept, St Ingbert//Germany/

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Journal Subject Category: NEUROSCIENCES

Abstract: Purpose: To assess a new **flexible**, multicontact spiral- **cuff** electrode made of polyimide with integrated platinum contacts for selective stimulation of nerve fascicles.

Methods: Polyimide **cuff** electrodes with 12 Pt sites in the spiral **cuff** were acutely implanted around the sciatic nerve of rats. Stimulation was applied through each one of the four tripoles of the **cuff** as single pulses of 10 μ s duration of increasing intensity. The motor responses were monitored from EMG recordings of gastrocnemius medialis (GM; innervated by the tibial nerve) and tibialis anterior (TA; innervated by the peroneal nerve) muscles. The torque developed in the ankle was simultaneously measured by means of a purposely designed apparatus. Recruitment curves were constructed for the CMAP of the GM and TA muscles and for the torque.

Results: In all nerves evaluated stimulation through one or two of the tripoles initially evoked a dorsiflexion with parallel recruitment of the TA muscle at low stimulation intensity; at higher stimulation amplitude activation of the tibial innervated muscles prevailed and led to predominant plantarflexion. On the other hand, stimulating through the other two or three tripoles evoked plantarflexion from the beginning, with increasing force from low to high stimulus intensity. The effectiveness of selective stimulation was mildly increased by applying a simultaneous transverse steering current. The threshold for torque dorsiflexion decreased and the dynamic range of stimulation that resulted in a net dorsiflexion expanded. The effects of steering currents were more noticeable with pulses of 80 % than 40 % of threshold value, and when applied from an opposite than from an adjacent anode.

Conclusions: Despite the relative small size of the rat sciatic nerve and the close apposition of tibial and peroneal fascicles, we proved the feasibility of using multipolar polyimide **cuff** electrodes to produce selective fascicular nerve stimulation.

Descriptors--Author Keywords: selective **electrical stimulation** ; peripheral nerve ; **cuff electrode** ; neural implant ; polyimide ; prosthesis

Identifiers--KeyWord Plus(R): PERIPHERAL-NERVE; **ELECTRICAL - STIMULATION** ; RECRUITMENT ORDER; ACTIVATION; REGENERATION; EXPERIENCE; MUSCLE; FIBERS

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**Title: Selective fascicular stimulation of the rat sciatic nerve with
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 , 2001

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...close apposition of tibial and peroneal fascicles, we proved the
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...Identifiers--PERIPHERAL-NERVE; **ELECTRICAL - STIMULATION** ; RECRUITMENT
ORDER; ACTIVATION; REGENERATION; EXPERIENCE; MUSCLE; FIBERS

Set	Items	Description
S1	1930	(ELECTRIC? OR LIGHT OR THERM? OR HEAT OR KINES OR KINESIO)- () (THERAPY OR THERAPEUT?) OR KINESIOTHERAP? OR KINESTHERAP? OR ELECTROSTIM? OR ELECTRO() STIMUL?
S2	98209	TENS OR (TRANSCUTAN? OR TRANS() CUTANE?) () (NERVE? ? OR ELEC- TRIC?) () STIMULAT? OR ELECTRIC? () STIMULAT?
S3	0	DC=(E02.810.150 OR E02.779.468 OR E02.831.580.468 OR E2.69- 0.265)
S4	12754	(PHOTO OR PHOTON OR LIGHT OR LASER OR MASER OR COHERENT? () - LIGHT) () (EMIT? OR EMISS?) () (DIODE? OR ELECTROD? OR SOURCE? OR PATCH?)
S5	29957	(PHOTO OR PHOTON OR LIGHT OR LASER OR MASER OR COHERENT? () - LIGHT) () (DIODE? OR ELECTROD? OR SOURCE? OR PATCH?)
S6	1091510	LED OR LEDS OR PED OR PEDS
S7	253720	BIOFEEDBACK? OR FEEDBACK? OR FEED() BACK?
S8	25106	CLOSEDLOOP? OR CLOSED() LOOP?
S9	178334	MESH? OR GRID?
S10	15858	(METAL? OR INSULAT? OR HEAT() CONDUCT? OR RESIN?) () (SHEET? OR MATERIAL? OR HOUSING?)
S11	196942	MOLD OR MOLDS OR MOLDED OR MOLDING OR MOLDABL?
S12	918	REMOLD?
S13	955156	REFORM OR REFORMS OR REFORMED OR REFORMING OR REFORMABL?
S14	3048008	FORM OR FORMS OR FORMED OR FORMING OR FORMABL?
S15	551280	FLEXIBL?
S16	116885	CONFORM OR CONFORMS OR CONFORMED OR CONFORMING OR CONFORMA- BL?
S17	806392	RETAIN OR RETAINS OR RETAINED OR RETAINING OR RETAINABL?
S18	1355	MEMORY() SHAPE? OR SHAPE() MEMORY
S19	265972	ADAPT OR ADAPTS OR ADAPTED OR ADAPTING OR ADAPTIBL?
S20	547124	SHAPE OR SHAPES OR SHAPED OR SHAPING OR SHAP?BL?
S21	123968	BEND OR BENDS OR BENT OR BENDING OR BEND?BL?
S22	592877	CONFIGUR?
S23	54555	RECONFIGUR?
S24	3048009	FORM OR FORMS OR FORMED OR FC
S25	543835	CUSTOMIZ? OR CUSTOMIS?
S26	345135	CAST OR CASTS OR CASTING OR C
S27	576114	ADJUST OR ADJUSTS OR ADJUSTEI
S28	0	IC=A61N?
S29	21584	CUFF OR CUFFS OR CUFFED OR CI
S30	52034	SLEEVE OR SLEEVES OR SLEEVED
S31	11368	S1:S3 AND S4:S6
S32	700	S31 AND (S9:S10 OR S29:S30 O
S33	68	S32 AND (S9:S10 OR S29:S30 O
S34	8	S33 AND S7:S8
S35	5	S33 AND S4:S6(10N) (S9:S10 OR
S36	0	S33 AND S1:S3(10N) S4:S6
S37	13	S34:S35
S38	12	S37 AND PY<2002
S39	8	RD (unique items)

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